

REMARKS

Claims 1-29 are pending in the application and stand rejected under 35 USC 103(a).

The Rejection of Claims 1-17

Under 35 USC 103(a)

Claims 1-17 stand rejected as obvious over US Patent 5,371,308 (hereafter referred to as Grosselink et al.) in view of US Patent 6,395,948 (hereafter referred to as Hope et al.). The Office Action states that Grosselink et al. describes the hydrotreating of a Fischer-Tropsch derived feed followed by thermal cracking to yield olefins which are known to be useful in an oligomerization process. Hope et al. teaches an oligomerization process for alpha olefins using an ionic liquid catalyst. The Office Action argues that it would be obvious to one skilled in the art to modify the process of Grosselink et al. using the catalyst of Hope et al. Applicants do not agree. In addition, Applicants further will argue that even if the teachings of Grosselink et al. are modified with the teaching of Hope et al., one skilled in the art still would not arrive at the invention claimed by Applicants.

The Teaching of Grosselink et al. and How It Differs From the Claimed Process

Grosselink et al. describes a process for producing lower olefins from a synthetic oil fraction, such as the products of a Fischer-Tropsch synthesis. Lower olefins are defined in the reference at column 1, lines 13 and 14, as "olefins having from 2 to 4 carbon atoms". The synthetic oil fraction used in carrying out the process of Grosselink et al. may be derived from a Fischer-Tropsch synthesis or from an oligomerization process (see column 2, lines 9-13). The synthetic oil fraction is hydroprocessed, i.e. treated in a process in the presence of hydrogen, and then thermally cracked to yield lower olefins.

The teaching of Grosselink et al. differs from the process claimed by Applicants in a number of respects.

The process described in Grosselink et al. is intended to produce lower olefins which, as noted above, are olefins containing from 2 to 4 carbon atoms. At no point in the process claimed by Applicants are lower olefins the intended product or an intermediate product. Applicants' process is intended to yield higher molecular weight products such as diesel and base oils. In fact, lower olefins are undesirable intermediates in Applicants' process. See, for example, page 2, lines 3 and 4, where the specification states that "it is desirable to minimize the yields of lower value products such as naphtha and C₄ minus products." Again on page 18 at lines 32 and 33, Applicants' specification specifically states that the temperature and conditions in the thermal cracking zone "should not be so severe that excessive C₄ minus hydrocarbons are generated." The lower olefins produced by the process taught in Grosselink et al. are not useful in the process claimed by Applicants and are, in fact, undesirable side products which reduce the yield of the desirable higher molecular weight hydrocarbons.

The hydroprocessing operation in Grosselink et al. is not necessarily the same as the as the hydrotreating step of Applicants' invention, since the reference's hydroprocessing step encompasses hydrocracking and hydroisomerization as well as hydrotreating. At column 4, lines 22 to 29, Grosselink et al. states:

"The conditions at which the hydroconversion is carried out depend upon the boiling range of the feed and the desired boiling range of the product of the hydroconversion process. The major reactions occurring during the hydroconversion process are a hydrogenation of the feed, a hydroisomerization of the feed and the hydrocracking of the heavier components in the feed."

See also column 6, lines 33 to 36, where the reference says that the hydroprocessed synthetic oil fraction is preferably "prepared by hydrogenation, followed by hydroconversion and/or hydrocracking of a synthetic oil fraction." This makes it clear that in at least one preferred embodiment of the Grosselink

et al. process the hydroprocessing operation is not a single step but a series of hydroprocessing steps, each of which is intended to accomplish a different objective.

While the hydroprocessing operation of Grosselink et al. would admittedly remove some of the oxygenates present, it is clear that two of the primary purposes are to reduce the boiling range of the products and to isomerize the feed prior to the thermal cracking step. As already noted, cracking of the molecules is intentionally minimized in Applicants' process. Applicants specifically define hydrotreating as "a hydrotreating operation in which the cracking conversion is 20 percent or less" (See page 14, lines 25-27). In addition, if the isomerization of the products is desired, in Applicants' claimed process isomerization is carried out as a separate step following the thermal cracking operation. The hydroprocessing step of Grosselink et al. is not necessarily the same as the hydrotreating step used in Applicants' invention because the objectives of the two process steps are not the same.

Finally, Grosselink et al. does not suggest the use of an oligomerization step using an ionic liquid catalyst as in Applicants' process. The oligomerization step using an ionic liquid catalyst is an important part of Applicants' invention. The hydrotreating step is essential in Applicants' process in order to remove substantially all of the oxygenates present in the feed to prevent them from interfering with the oligomerization of the olefins. This has no counterpart in Grosselink et al. because the reference does not recognize the importance of lowering the amount of oxygenates present to the same level as required in Applicants' process.

Since Grosselink et al. does not include a polymerization step using an ionic liquid catalyst, the reference is not concerned with the removal of the oxygenates down to the levels required in Applicants' process. In Applicants' process it is essential that oxygenates be reduced to 1500 ppmw elemental oxygen or less (see page 17, lines 10-12 where the phrase "significantly reduced" is defined). Even lower levels equal to 100 ppmw elemental oxygen

or less are preferred. Grosselink et al. does not recognize the importance of reducing the oxygen present down to this low level..

The Teaching of Hope et al. and
How It Differs From the Claimed Process

In order to overcome the shortcomings of Grosselink et al. the Office Action has combined the primary reference with the teachings of Hope et al. which describes the use of ionic liquid catalysts for the oligomerization of alpha olefins. However, the olefins employed as feeds in the process of Hope et al. are very different from the Fischer-Tropsch feeds used in Grosselink et al. and in Applicants' process. The feed to the oligomerization process described in Hope et al. are pure alpha olefins, and the products of the process of Hope et al. are all poly alpha olefins.

As noted in column 3 at line 17 of Hope et al., the alpha olefins used as feed in his oligomerization process contain from 4 to about 14 carbon atoms in the molecule. The feeds described in Hope et al. consist of a single pure alpha olefin or a mixture of only a few alpha olefins having a narrow range of molecular weights. By contrast, the product of the Fischer-Tropsch synthesis reaction is a mixture of hydrocarbons containing from 2 to 100 or more carbon atoms. The product of the Fischer-Tropsch synthesis does contain a significant amount of olefins, however, the olefins present are not limited to alpha olefins. Both alpha olefins and internal olefins are present. In addition, the Fischer-Tropsch product also contains significant amounts of oxygenates, primarily in the form alcohols, although ketones, carboxylic acids, aldehydes, and anhydrides are also present in lesser amounts. The alpha olefin feeds of Hope et al. would be expected to contain very few impurities. Therefore, Hope et al. is not dealing with the same problem addressed by Applicants. Likewise, there is no basis for combining the teaching of Hope et al. with the teaching of Grosselink et al. in the absence of Applicants' disclosure.

Hope et al. teaches that the alpha olefin feeds must be free of any organic diluents which he found interferes with the oligomerization reaction when an ionic liquid catalyst is used. See column 3, lines 22-26. This has nothing to do with the process described in Grosselink et al. which is not concerned with the production of poly alpha olefins.

In summary, Hope et al. does not overcome the limitations of Grosselink et al., and the secondary reference is not concerned with the same problems addressed either by Grosselink et al. or by Applicants. There is nothing of record to suggest to one skilled in the art to combine the teachings of Hope et al. with the teaching of Grosselink et al. in the manner the Office Action has done. Therefore, it is not obvious within the meaning of the statute that the products of the process of Grosselink et al. could be used as feed to the process of Hope et al. Even if the lower olefins of Grosselink et al. were used as feed in the process of Hope et al., it is by means certain that the products would be the diesel and base oil products made using Applicants' process, since the feed to the oligomerization process used by Applicants are higher molecular weight olefins not the lower olefins taught in the primary reference. Therefore, it is argued that claims 1-17 are patentable over the process of Grosselink et al. in view of Hope et al., and allowance of those claims is solicited.

The Rejection of Claims 18-22

Claims 18-22 stand rejected as obvious over Grosselink et al. in view of Hope et al. further view of US Patent 5,000,840 (hereafter referred to as Anthes et al. Anthes et al. teaches the catalytic dewaxing of an oligomerization product to produce base oil. However, Anthes et al. does not overcome the deficiencies of either Grosselink et al. or Hope et al. Anthes et al. is concerned with the dewaxing of feeds prepared from the oligomerization of lower olefins. The reference does not contemplate the production of base oils from Fischer-Tropsch derived olefins. It is not concerned with the problems associated with oligomerizing higher olefins using an ionic liquid catalyst.

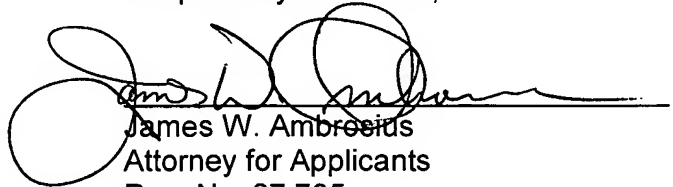
Applicants argue that there is nothing of record which ties the teachings of the references together in the absence of Applicants disclosure. It is well established that it is not proper to use Applicants' invention as the basis for combining the teachings of the prior art references. Therefore, it is submitted that claims 18-22 are patentable over the combination of Grosselink et al., Hope et al., and Anthes et al.

The Rejection of Claims 23-29

Claims 23-29 stand rejected over the combination of Grosselink et al., Hope et al., and US Patent 6,632,416 (hereafter referred to as Elomari). Elomari describes the use of SSZ-53 to hydrofinish a dewaxed hydrocarbon feed. However, like Anthes et al., Elomari fails to overcome the deficiencies of Grosselink et al. and Hope et al. The reference contains no teaching related to the production of olefins from Fischer-Tropsch derived feeds, the removal of oxygenates, or the oligomerization of higher olefins to produce base oils. As with Anthes et al., the only link between this reference and the other cited references is Applicants disclosure. Therefore, it is argued that claims 23-29 are patentable over the combination of Grosselink et al., Hope et al., and Elomari.

It is respectfully submitted that all of the claims in the case are directed to patentable subject matter, and allowance in due course is respectfully solicited.

Respectfully submitted,



James W. Ambrosius
Attorney for Applicants
Reg. No. 27,705
(925) 842-1531

JWAmbrosius
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